

New Species of Mosquitoes from Taiwan (Diptera : Culicidae)*

Part II. New Species of *Tripteroides*, *Orthopodomyia*, *Culiseta* and *Uranotaenia*

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Abstract

The present paper describes the larvae, pupae, males and females of five new species of mosquitoes belonging to genera *Tripteroides*, *Orthopodomyia*, *Culiseta*, and *Uranotaenia*. These mosquitoes are named *Tripteroides* (*Tripteroides*) *cheni*, n. sp., *Orthopodomyia lanyuensis*, n. sp., *Culiseta* (*Culiseta*) *lishanensis*, n. sp., *Uranotaenia lui*, n. sp., and *Uranotaenia nii*, n. sp. The first two species were found in Lanyu Island (formerly known as Botel Tobago or Kotosho), an offshore island southeast of Taiwan proper, and the remaining three species in Taiwan proper. Following the morphological descriptions, the distribution, biology, and systematics of the species are discussed.

During the studies on the vectors of mosquito-borne diseases in Taiwan, it was felt that the systematic studies on the culicine mosquitoes of Taiwan were meagre and that great difficulty existed in identification of the local mosquito fauna. An attempt to clarify the situation a study of the culicine fauna was therefore undertaken. Over a period of years mosquitoes were collected from all possible breeding niches and from areas representing different terrain features on Taiwan proper and its adjacent islands.

The mosquitoes were collected by a number of methods currently in use elsewhere. However, larval collection was best suited to fulfill the purpose of systematic treatment. The collected mosquito larvae were sorted by inspection, kept individually in tubes and reared to adults with the exuviae preserved and numbered. This was done by an addition of a serial decimal number to the accession number representing each habitat of collection. Both larval and pupal exuviae of the same specimens were mount-

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**Special Contribution

ed on to a glass slide with balsam after passage through two changes of 95% alcohol and clearing in creosote-xylene mixture (1:1 in volume). The specimens were permitted to remain in each solution for approximately one hour. One hundred eight species of mosquitoes of 14 genera have thus far been collected. Among these 69 have already been recorded from Taiwan by various workers and the remaining 39 species are either new to Taiwan or new to science. The

previously recorded species other than *Anopheles* have been listed and annotated (Lien, 1962). Part I of this series describes two new species of *Aedes* (*Finlaya*). The present paper describes five new species belonging to genera *Tripteroides*, *Orthopodomyia*, *Culiseta*, and *Uranotaenia*. Terminology used for description conforms to that of Belkin (1962) except that of wing-venation which conforms to that of Barraud (1934). The following are the descriptions of the five new species.

TRIPTEROIDES (TRIPTEROIDES) CHENI LIEN, N. SP.

MALE. *Head.* Anterior half of vertex with a broad band of blue broad scales, posterior half with brownish-black somewhat erect narrow scales, a patch of broad silvery scales low down at each side; clypeus, proboscis and antenna dark brown; proboscis slender, longer than abdomen; palpi about one-seventh the length of proboscis; antenna plumose; torus yellowish brown, bare. *Thorax.* Integument of scutellum and anterior and lateral margin of mesonotum yellowish brown; that of mesonotum and postnotum brown; ten dark brown bristles present on anterior margin of mesonotum; dorsocentral bristles present; mesonotal scales narrow and dark brown; scutellar scales rather small, broad, and dark brown; some (about ten) dark brown bristles present along lateral margin of mesonotum on each side in front of and at the level of wing base; *apn* yellowish brown, with seven dark brown bristles and dark brown broad flat scales; *ppn* yellowish brown, with a dark brown bristle low down at side, some very narrow dark brown broad scales and a few small dark brown broad scales also present on *ppn*; propleuron yellowish brown, with three bristles; spiracular bristles present;

paratergite, postspiracular and subspiracular areas light brown, bare; prealar knob yellowish brown, with three bristles; sternopleuron dark brown on larger upper part, covered with a large patch of silvery white broad scales; mesepimeron largely dark brown, with an elongate patch of silvery white broad scales; meron light brown, bare; metapleuron yellowish brown. Wing scales dark, not very dense, and mainly rather narrow. Femora marked with two silvery spots on anterior surface and a short silvery linear marking running from base; medial silvery spot of hind femur confluent with the silvery linear marking; tibiae and tarsi dark brown, unbanded; front claw simple; haltere pale, knob dark-scaled.

Abdomen. Dorsum brownish-black, with reddish-purple sheen; tergites II-VI with large lateral silvery patches which do not form bands on dorsum; venter entirely pale yellowish. *Terminalia* (Fig. 1, a, b). Lobe of ninth tergite wide and armed with seven flattened spines; clasper comparatively short and enlarged apically; the shape of phallosome, when viewed laterally, somewhat similar to that of *Tripteroides poweli poweli* (illustrated by

Baisas and Ubaldo-Pagayon, 1952), and quite different from that of *Tripteroides bambusa* (Fig. 1,c).

FEMALE. Very similar to male, differing only as follows: Antenna much less plumose. Medial silvery spot of hind femur not confluent with the silvery linear marking running from base. *Terminalia*. Very similar to that of *Tripteroides bambusa*, but only one spermatheca present.

PUPA (as Fig. 2, g, h).

LARVA (Fig. 2, a-f). *Head*. Antenna short, smooth; hair 1-A short and single, arising at three-fifths from base; head hair 1-C very stout and strongly curved inward; 4-C single; 0, 3-C both minute, single; 5-C single; 6-C single or bifid; 7-C 2-4-branched; 8-C rather short, single; 9-C single or bifid; 10-C single; 11-C 12-14-branched, plumose; 12, 13-C both single; 14-C stellate, 6-9-branched, plumose; 15-C 3-4-branched. Mentum with 17 teeth; median hairs of mouth brush pectinate. *Thorax*. Prothoracic hair 0-P stellate, 11-branched; 1-P stellate, 14-branched; 2-P single; 3-P 4-branched; 4-P 4-branched; 5, 6-P both single and long; 7-P stellate, 11-branched; 8-P stellate, 15-17-branched; 9-P 4-5-branched, long; 10-P only about half as long as 9-P single, terminating in a single sharp point; 11-P short, single; 12-P single; 13-P stellate, 12-15-branched; 14-P stellate, 21-22-branched. *Abdomen*. Abdominal segment VIII with hair 1-VIII stellate, about 25-branched; 2-VIII single; 3-VIII 7-8-branched; 4-VIII single; 5-VIII 5-branched; comb of 20 teeth arranged in a single row, dorsal 8 teeth sharply pointed and simple, the remaining teeth with coarse apical and fine lateral fringe. Siphon with pecten of five elongate teeth arranged subventrally; hair 1-S consisting of 12 pairs, each hair tuft 2-4-branched,

the most proximal pair subventral, six pairs ventral, two pairs lateral and three pairs subdorsal in position. Anal segment nearly completely encircled by a sclerotized saddle; hair 1-X 2-7-branched; 2-X 4-5-branched, finely plumose; 3-X single, finely plumose; posterior border of saddle with 5-6 finely fringed stout spines; 4-X consisting of only two hairs, each with 2-3 branches. Anal gills about two times as long as saddle; ventral pair a little shorter than the dorsal pair.

TYPE SPECIMENS. Holotype, male (78431. 1) with larval and pupal skins, *ex* tree-hole in coastal forest, Yayu, Hongtou village, Lanyu, May 19, 1961, P. S. Chen; allotype, female (78431. 2) with larval and pupal skins, same data as for holotype; paratypes, one female (70799. 1), *ex* tree-hole, coastal forest, Yujen, Hongtou village, Lanyu, April 17, 1956, J. C. Lien; one male (70819. 1), *ex* tree-hole, coastal forest, Tungching village, Lanyu, April 19, 1956, J. C. Lien, T. S. Lo; one female (70821. 1), *ex* tree hole, Tungching, Tungching village, Lanyu, April 19, 1956, J. C. Lien, T. S. Lo; two males (780879.1 and .2), *ex* bamboo-stump, south of Hongtou, Hongtou village, Lanyu, May 2, 1956, J. C. Lien and T. S. Lo. The specimens are in the collection of Taiwan Provincial Malaria Research Institute, Nankang, Taipei Hsien, Taiwan, Republic of China.

DISTRIBUTION. Known only from Lanyu Island.

BIOLOGY. The immature stages breed in tree-holes in coastal forest and bamboo-stumps on foothill area. The habits of adults are unknown.

SYSTEMATICS. This species falls in the *nitidoventer* group, and very closely related to *Tripteroides bambusa*, differing chiefly in the shape of male phallosome, in having only

one spermatheca in female (three spermathecae in *T. bambusa*), and also in having brown instead of blackish integument of mesonotum. The larva is not easily distinguished from *T. bambusa*. The larval prothoracic hair 9-P is 4-5-branched in *T. cheni* and 2-3-branched in *T. bambusa*. The stellate hairs on thorax

and abdomen of larva are somewhat curled and with more branches in *T. cheni*, and straight and with less branches in *T. bambusa*.

REMARKS. This species is named after Mr. Pao Shu Chen, who assisted the preparation of illustrations and participated in the field collection.

ORTHOPODOMYIA LANYUENSIS LIEN, N. SP.

MALE. *Head*. Vertex with pale yellowish narrow curved scales over the dorsum and with a line of similar scales along the eye margins, a tuft of long white scales extending down between the eyes; the dorsum also bearing large numbers of pale upright forked scales, those present at the posterior darker; a few black and numerous broad white scales at sides. Proboscis dark, marked with a pale ring at basal two-fifths, and a broad (about one-fifth of proboscis) pale patch subapically; the area distad to the subapical pale patch very dark; labium pale. Palpus about three-fourths of proboscis, dark, marked with a small dorsal white patch basally, and with white rings over the joint II-III, apically on segment III, and over the apex of segment IV and along all of segment V (a total of one patch and three rings of pale scales); segment V markedly more slender and shorter than the others and turned upward; a few stiff setae at the apices of segments III and IV; a narrow longitudinal bare stripe on medioventral side of segments I-III, wider toward base of palpus; torus with small yellowish pale scales on inner side; a patch of large broad white scales on the first flagellar segment, and some greatly elongate hair-like white scales on the flagellar segments II-V. *Thorax*. Mesonotum with well developed acrostichal and dorsocent-

ral bristles and longitudinal bare space submedially; rather thinly covered with narrow yellowish scales; dark narrow scales also present, forming a small patch medially, two large patches submedially, and a large patch in front of prescutellar space; posterolateral side of prescutellar space with pale narrow scales; all lobes of scutellum with outstanding elongate pale scales; *apn* with broad white scales; *ptn* with narrow pale scales along anterodorsal margin, broadened scales over the posterior one-half, paratergite, postspiracular area and prealar knob bare; white broad scales present on subspiracular area, propleuron, small area just below prealar knob, upper half of sternopleuron, posterior margin of sternopleuron and lower part of mesepimeron; a small patch of narrow yellowish pale scales present on upper mesepimeron that merges with the dorsal mesepimeral tuft. Wings dark, the costa marked with pale scaling on humeral, presectoral, sectoral, subcostal, preapical and apical areas; basal and prehumeral pale areas very small or indistinct or even lacking. The humeral pale area also involving veins 1 and 5; the secotral pale area on veins Sc and 1; the subcostal pale area on veins 1, 2, 3 and 4, and a few pale scales on vein 5.1; the preapical pale area on veins 1, 2.1, 2.2, 4.1 and 4.2; and

the apical pale area on veins 1, 2.1, 2.2, 3, 4.1, 4.2 and 5.1; these pale areas usually subapical on veins 2.1 and 2.2, and very indistinct on veins 4.1, 4.2 and 5.1. An accessory pale area present on vein 1; and an additional pale area present on veins 4 and 5.1, just distad of the fork of vein 5. Haltere pale. Coxae with broad white scales basally; femora speckled and marked with pale scaling, some pale scaling apically, and a pale patch subapically on ventral side; tibiae with varying amount of scattered pale scaling, and an apical white ring. First segment of each tarsus usually with scattered white scaling; fore-tarsi with a narrow basal pale ring on tarsal segment I and narrow pale rings on all tarsal joints; mid-tarsi with a narrow basal pale ring on segment I, narrow pale rings over joints I-II, II-III, and apex of segment III and whole of segments IV and V; hind-tarsi with a small basal patch on segment I, broad pale rings over joints I-II, II-III, and over apex of segment III and whole of segments IV and V. Fore- and mid-tarsal claws unequal, longer claw unidentate, smaller one simple; hind tarsal claws equal, simple. *Abdomen*. Abdominal tergites dark, with a baso-sublateral spot and a lateral stripe on I, a basal median white patch and basolateral and apicolateral spots on II, narrow basal white bands and small not well-defined apicolateral spots on III-VIII, subdorsal median white spots on VI and VII. Sternites dark, with narrow basal pale bands on III-VIII, the pale bands on VIII broader than the others, many scattered pale scales on II. *Terminalia* (Fig. 1, d). Basal lobe of sidepiece with 9 prominent elongate spines, several very slender spines just ventrad to these; sidepiece with numerous hairs of various shapes and sizes; phallosome and proc-

tiger as figured, very simple.

FEMALE. Agreeing with male in general coloration; torus and the first flagellar segment with broad white scales on inner side; palpus slightly less than one-half of proboscis, dark brown, with narrow pale area at base of the first segment, apices of subapical and apical segments. Proboscis dark brown, basal half entirely dark, apical half pale yellowish both dorsally and ventrally except a narrow apical dark band and a broad dark band at about middle of the apical half; labium pale; abdominal tergites with a small subdorsal median white spot on V in addition to those on VI and VII; wings without basal and prehumeral pale areas on costa; presectoral and sectoral pale areas very much reduced to a few scales beneath in front; basal pale bands on sternites narrower.

PUPA (as Fig. 3, h, i).

LARVA (Fig. 3, a-g). *Head*. Antenna smooth, swollen subbasally; hair 1-A inserted at about basal one-fourth, with 7 plumose branches; head hair 1-C single, slender; 0, 3-C small, simple; 7-C with 9-12 plumose branches; 6-C with 6-7 plumose branches; 5-C with 4-5 plumose branches; 4-C with 7 plumose branches; 8, 9-C both bifid; 10-C single; 11-C 4-branched; 12-C 4-branched; 13-C 5-branched; 14-C single; 15-C with 3-4 branches; mentum with 20 teeth. *Thorax*. Prothoracic hair 1-P short, with 3 plumose branches; 2-P short, single; 3-P single and very long, all these hairs arising close together; 4-P short, 4-7-branched; 5, 6-P both single; 5-P much longer than 6-P; 7-P long, with 7 plumose branches; 8-P with 4 plumose branches. *Abdomen*. Abdominal hairs 6-I and 6-II each with 4-5 branches, the branches coarse up to the tips and with a few fraying toward the base; segments VII and VIII covered with a dark sclerotized plate, both

incomplete ventrally; the comb of segment VIII is borne in a slight posterior emargination of the plate and consisting of 33-36 prominent teeth, the comb teeth of two distinct sizes, 10-11 large teeth, each of these alternating with 1-3 small scale-like teeth, the larger teeth with the central spine not distinctly broader and longer than the lateral spines; hair 1-VIII small, with 5-6 slightly plumose branches; 2, 4-VIII both single, 3-VIII large, with 11 plumose branches; 5-VIII small, with 3-4 plumose branches. Anal plate very dark, complete; hair 1-X 2-3-branched; just basad of the anal plate is a narrow dark sclerotized ring that is incomplete both dorsally and ventrally; hair 4-X consisting of 14 densely branched tufts, each tuft borne on the grid, the lateral bar of the grid dark; 2-X 14-branched, one of the more ventral branches much longer than the others; 3-X single; anal gills with dorsal pair approximately the length of the anal plate, and twice the length of the ventral pair. Siphon very dark except for the apex; rather sharply tapering from the insertion of hair 1-S; a paler circular area at base; no acus or pecten; siphon hair 1-S inserted at slightly before the middle, with 9 plumose branches. Siphon index about 4 in compressed specimen.

TYPE SPECIMENS. Holotype, male(78400.6) with larval and pupal skins, *ex* tree-hole, south of Hongtong, Lanyu, Taitung Hsien, Taiwan, May 28, 1961, P. S. Chen; allotype,

female(78400.18) with larval and pupal skins, same data as for holotype; paratypes, nine males(78400.1, .3, .4, .5, .7, .11, .12, .15, .16) and eight females(78400.2, .8, .9, .10, .13, .14, .17, .19) with corresponding larval and pupal skins, same data as for holotype. The specimens are in the collection of Taiwan Provincial Malaria Research Institute, Nankang, Taipei Hsien, Taiwan, Republic of China.

DISTRIBUTION. Very widely distributed throughout Lanyu Island. It has not been found on Taiwan proper.

BIOLOGY. The larva breeds in tree-holes in association with *Aedes melanocephalus*, a species of mosquito new to Lanyu and Taiwan Province. The habits of adults are unknown.

SYSTEMATICS. This species falls in Edwards' (1934) group A (*Orthopodomyia*), and Knight and Mattingly's (1950) subgroup I (*anopheloides*). In the larval stage, this species is closely related to *O. madrensis* Baisas in having specialized dorsolateral hairs of abdominal segments I and II, however, in the adult stage, it differs from *O. madrensis* in having the venter of abdomen not wholly white, the basal part of wing costa not extensively pale, and also different scaling on proboscis. The pale scaling of hind legs in *O. lanyuensis*, n. sp. is very similar to that of *O. wilsoni* Macdonald, but in the larva of *O. wilsoni*, the dorsolateral hairs of abdominal segments I and II are not specialized.

***CULISETA (CULISETA) LISHANENSIS* LIEN, N. SP.**

MALE. *Head*. Vertex with narrow pale yellow scales, dark upright forked and narrow hair-like light brown scales on a large median area, some broader pale scales on lateral areas; torus dark brown, with some fairly broad pale scales on inner side; antenna

plumose, dark brown, only a little longer than one-half the length of proboscis; clypeus and proboscis, dark brown; proboscis longer than fore-femur with seven long bristles on underside near base; palpus dark brown, paler at joints, about as long as proboscis or a little

shorter than proboscis; some long hairs on segments III and IV; shorter hairs on segment V; this segment is widened and spatulate. *Thorax*. Mesonotal integument dark brown, with a sparse covering of golden, narrow, curved scales; achrostichal and dorsocentral bristles rather slender, short and curved; bristles on the area before wing base dark, rather long and stout; scutellum with broad pale scales on all lobes; scutellar bristles long and dark brown; postnotum and integument of pleurae dark brown; *apn* with fairly broad pale scales; *ppn* with some narrow curved golden scales on upper aspect and pale broad scales on middle aspect. The following pleural areas each with a patch of broad pale scales; paratergite, postspiracular area, subspiracular area, propleuron, four patches on sternopleuron (a patch just below prealar bristles, another patch below that patch, a linear patch below near anterior border and another linear patch below near posterior border), two patches on mesepimeron; over 20 bristles on *apn*, three on *ppn*; seven on spiracular, nine on prealar, 11 on sternopleural, 18 on propleural, ten on upper mesepimeral and one on lower mesepimeral areas. Wing squama fringed with hairs, allula with long narrow scales; veins clothed with long narrow dark scales; membrane darker in patches chiefly in region of cross-veins and at bases of forks, cross-veins 2-3, 3-4 and 4-5 closely approximated, subcosta ending beyond level of base of vein 3, base of vein 1 (remigium) with three hairs on upperside and many hairs on underside; haltere knob dark. Legs dark brown, with pale scaling; coxae with a patch of broad pale scales on anterolateral aspect; trochanters dark brown; all the femora dark brown, with a kneespot, a pale line on basal half of anterior surface of forelegs; some pale

scales also present at two-thirds from base; anterior surface of mid-legs dark, a pale ring present on mid-femur at base; posterior surface of all femora pale roughly on basal four-fifths; hind-femur white except for a subapical black ring and a dark line along the dorsal edge; tibiae dark, with apical pale rings; tarsi entirely dark; hind tarsi indistinctly paler ventrally at joints. *Abdomen*. Tergites brownish black; tergite I with numerous golden bristles; tergites II-VIII with basal pale bands; the bands incomplete medially on segments IV-VII; sternites brownish-black, with basolateral silvery patches and midapical pale golden patches. *Terminalia* (Fig. 1, e). Very similar to that of *Guliseta niveitaeniata* of India, differing in shape of lateral plate of phallosome, and in having weaker setae on subapical lobe of sidepiece, and lobes of ninth tergite widely separated.

FEMALE. Agreeing with male in general coloration, only differing as follows: Pale yellow scales on dorsal median area of vertex a little broader than in male; a patch of pale yellow scales between eyes. Antenna less plumose, flagellar segments brown with brown pubescence and hairs. Palpus about one-fifth the length of proboscis, entirely dark, with some sprinkling of pale scales on basal one-third, tip nude, appearing pale; some pale scales present beneath clypeus in front of eye margin; fore-femur with the scales at two-thirds from base forming a patch; ventral aspect of hind-tarsi entirely dark; over 20 anterior pronotal, three posterior pronotal, eight spiracular, 12 prealar, 15 sternopleural, 14 propleural, six upper mesepimeral and two lower mesepimeral bristles.

PUPA (as Fig. 4, g, h).

LARVA (Fig. 4, a-f). *Head*. Antennal shaft pale, darker toward apex, finely and

sparsely spiculate, antennal hair 1-A with five plumose branches, about one-third as long as antennal shaft; head hair 1-C single, slender, slightly curved inward; 7-C with 8-12 plumose branches; 6-C with 3-4 plumose branches; 5-C with 6-7 plumose branches; 4-C short, with 3-4 fine branches; 8-C single; 9-C trifold; 10-C single or furcated into 4 apically; 11-C 6-8-branched; 12-C 4-5-branched; 13-C single, long; 14-C short, single spinous; 15-C 4-5-branched. Median hairs of mouth brush strongly pectinate; mentum with 25 teeth. *Thorax*. Prothoracic hair 0-P 14-branched; 1-3-P plumose, arising from a sclerotized plate; 1-P long, 3-4-branched; 2-P long, single; 3-P shorter than 2-P, 6-9-branched; 4-P plumose, 8-10-branched; 5, 6-P plumose, both single; 7-P plumose, 6-8-branched; 8-P plumose, 4-branched; 9-12-P arising from a sclerotized plate; 9-P plumose, 4-5-branched; 10-P single, plumose; 11-P very short, furcated into four apically; 12-P single, plumose; 14-P bifid. *Abdomen*. Segment VIII with hair 1-VIII plumose, 3-branched; 2, 4-VIII both single; 3-VIII plumose, 9-10-branched; 5-VIII plumose, 4-branched; comb of 43-51 scale-like fringed teeth in a triangular patch; siphon index about 2.5 in compressed specimen; pecten of 23-39 teeth, commencing from base and extending nearly to apex of siphon tube, basal 14-19 teeth short, with 2-3 basal denticles, the remaining 11-14 teeth single, very slender and long, hair-like; hair 1-S basal in position, with 5-7 plumose long branches. Anal segment completely ringed; hair 1-X bifid; 2-X long, 9-branched; 3-X single, about twice as long as 2-X; 4-X consisting of 15 hairs, proximal three hairs arising outside of barred area, each with 4-10 branches; anal

gills slender, tapering to a point, more than twice as long as anal segment.

TYPE SPECIMENS. Holotype, male (85054.1) with larval and pupal skins, concrete pool, Lishan in Hoping township, Taichung Hsien (1600 m), Feb. 8, 1961, T. S. Lo; allotype, female (85054.2) with larval and pupal skins, same data as for holotype; paratypes, four males (85054.3, .5, .7 and .9), and seven females (85054.4, .6, .8, .10, .11, .12 and .13), same data as for holotype; three males (85052.1, .3 and .5), five females (85052.2, .4, .6, .7 and .8), *ex* another concrete cement pool, Lishan of Hoping township, Taichung Hsien, Taiwan, Feb. 8, 1961, T. S. Lo. The specimens are in the collection of Taiwan Provincial Malaria Research Institute, Nankang, Taipei Hsien, Taiwan, Republic of China.

DISTRIBUTION. Known also from Alishan of Wufeng township in Chiayi Hsien, Taiwan (2200-3000 m).

BIOLOGY. The larva breeds in concrete water containers and shallow ditches with clear standing water. The habits of adults are unknown.

SYSTEMATICS. This species is very closely related to *Culiseta niveitaeniata* of India, differing from it chiefly in having narrow curved golden scales instead of fairly broad scales on upper part of *ppn*, and in having an incomplete basal band on tergites IV-VII (instead of complete bands). Male terminalia of this species is also different from that of *C. niveitaeniata*, in the shape of lateral plate of phallosome, and in having weaker setae on subapical lobe of sidepiece and lobes of ninth tergite widely separated instead of closely approximated.

URANOTAENIA LUI LIEN, N. SP.

MALE. *Head.* Clypeus, palpus and proboscis dark, palpus about as long as clypeus and about one-ninth of proboscis; proboscis swollen apically, about three-fourths as long as fore-femur and a little shorter than abdomen; torus brown, with no scales; antenna normal, plumose, the last two flagellar segments subequal in length, about 2-3 times as long as each of the remaining segments; vertex largely covered with dark broad flat and brown upright forked scales; broad flat scales on lateral aspect appearing paler; no pale border to eyes. *Thorax.* Mesonotal and scutellar integument brown; mesonotum with dark brown narrow scales; acrostichal bristles dark-brown, slender, short and curved; dorsocentral bristles dark brown, stout, long and curved; scutellum with dark brown narrow scales; no line of flat scales in front of wing-root; *apn* pale, with three bristles; *ppn* pale, with only one bristle at posterior corner; both *apn* and *ppn* apparently with no scales; pleuron uniformly pale, with 3-4 propleural, 1 spiracular, 1 prealar, 8 sternopleural, 2-3 upper mesepimeral and 1 lower mesepimeral bristles and some broad greyish translucent scales on sternopleuron and mesepimeron; coxae and trochanters pale; all legs entirely dark; first hind-tarsal segment about twice as long as the second; wing dark scaled, scales broad; alula with a patch of broad dark scales; squama bare; haltere knob dark. *Abdomen.* Abdominal tergites entirely dark; sternites a little paler than tergites. *Terminalia* (Fig. 1, f). Clasper moderately long, wide on basal half, apical part recurved and tapering to tip; the shape of phallosome somewhat different from that of *Uranotaenia bimaculata*.

FEMALE. Ageing with male in general

coloration, only differing as follows: Palpus about 1.5 times as long as clypeus and about one-seventh of proboscis; proboscis swollen apically, about eleven-twelfths as long as fore-femur and a little shorter than abdomen; antenna with sparse flagellar bristles and pubescence; the first flagellar segment about one-half as long as the second, the remaining segments subequal in length; propleuron with four bristles.

PUPA (as Fig. 5, g, h).

LARVA (Fig. 5, a-f). *Head.* Antenna very dark, sparsely apiculate; hair 1-A 2-branched, arising at two-thirds from base; head hair 0-C very tiny, flattened; 1-C inconspicuous, almost invisible under magnification of 450 powers; 3-C small, single, curved inward; 4, 6, 7-C all in a transverse line at about level of bases of antenna; 7-C with 10-12 branches; 6-C trifid; 5-C single, far behind 6-C; 4-C with 11-14 branches, each of the branches furcated into several fine branches; 8-C slender, single; 9-C slender, bifid; 10-C slender, single; 11-C very short, trifid; 12-C bifid; 13-C single; 14-C single; 15-C trifid; mentum with 17 teeth; median hairs of mouth brush not pectinate. *Thorax.* Prothoracic hairs 1-3-P all arising from a sclerotized plate, single and long; 4-7-P all arising from a small separate plate, single and long; 8-P short, single. *Abdomen.* Segment VIII with hair 1-VIII very short, bifid or trifid; 2-VIII bifid; 3-VIII more than one-half as long as siphon, with 4-5 plumose branches; 4-VIII single; 5-VIII with four fine branches; a large sclerotized plate on both sides of the segment, carrying comb of 8-9 apically and laterally fringed teeth. Anal segment with a sclerotized complete ring, posterior border with minute denticles, but

no spines; hair 1-X slender, with three short branches; 2-X bifid; 3-X single; 4-X consisting of ten hairs on barred area, each with 1-3 branches. Anal gills shorter than anal segment. Siphon very slightly tapering, with prominent acus; index about two; hair 1-S with four inconspicuously plumose branches, arising a little beyond middle; pecten of 12-13 apically and laterally fringed teeth, all about the same size.

TYPE SPECIMENS. Holotype, male with larval and pupal skins (62032.6), *ex* tree-hole, Chihtuan of Loswei village (1200m), Tatung, Ilan Hsien, September 9, 1961, C. L. Chung and L. C. Lu; allotype, female with larval and pupal skins (62032.8), same data as for holotype; paratypes, 20 males (62032.1, .2, .4, .16, .17, .19, .20, .23, .36, .39, .43, .45, .48, .49, .52, .60, .63, .65, .69, .71), and 48 females (62032.3, .5, .7, .9, .10, .11, .12, .13, .14, .15, .18, .21, .22, .24, .25, .26, .27, .28, .29, .30, .31, .32, .33, .34, .35, .37, .38, .40, .41, .42, .44, .46, .47, .50, .51, .53, .54, .55, .56, .57, .58, .59, .61, .62, .64, .67, .68, .70), with corresponding larval and pupal skins, same data as for holotype. The specimens are in the collec-

tion of Taiwan Provincial Malaria Research Institute, Nankang, Taipei Hsien, Taiwan, Republic of China.

DISTRIBUTION. Known only from type locality.

BIOLOGY. The larva breeds in tree-holes together with *Uranotaenia nivipleura*, species of mosquito new to Taiwan. The habits of adults are unknown.

SYSTEMATICS. This species falls in Group B (Pseudoficalbia) of Edwards (1934) and is very closely related to *Uranotaenia moultoni* Edwards and *Uranotaenia brevirostris* Edwards. It differs from *U. moultoni* and *U. brevirostris* chiefly in having broad greyish translucent scales on sternopleuron and mesepimeron, but shows more resemblance to *U. moultoni* than to *U. brevirostris* in having well contrasted mesonotum and pleuron, and dark brown scales on mesonotum.

REMARKS. This mosquito is named after Mr. Liang Cheng Lu of Taiwan Provincial Malaria Research Institute, who assisted in rearing mosquitoes and participated in the field collection.

URANOTAENIA NII LIEN, N. SP.

MALE. *Head*. Vertex covered with broad flat brown scales, those along eye-margins appearing pale and those on nape green to bluish-purple when viewed from certain positions, some upright scales present along eye-margins and nape, the end of these scales very slightly expanded. Antenna plumose; torus pale brown, darker on inner side. Clypeus brown; palpus brown, quite short, projecting very slightly in front of clypeus; proboscis brown, only a little shorter than fore-femur (11/12), slightly expanded apically. *Thorax*. Integu-

ment of mesonotum yellowish brown, covered with narrow pale brown scales; acrostichal, dorsocentral and supra-alar bristles present, all dark brown; scales over wing-root slightly broader and paler than those on the remaining part of mesonotum; scutellar lobes covered with brown broad flat scales; postnotum brown, bare; integument of pleurae pale brown; postspiracular area a little darker; *apn* brown, with lanceolate scales having silvery sheen, *pm* with a few lanceolate scales and a bristle near posterior corner; sternopleura

with white lanceolate or silvery scales on upper part and posterior margin; some similar scales present on posterior half of sternopleuron and upper part of mesepimeron; paratergite bare; prealar knob with a short coarse bristle; about ten sternopleural bristles, one lower mesepimeral bristle and no spiracular bristle. Haltere pale, knob dark brown. Wing scales dark brown; anterior fork shorter than posterior fork; sixth vein ending before the fork of fifth vein; some broad lanceolate scales present on veins 2, 3 and 4 toward apex; squama and allula bare. Legs dark brown; femora paler beneath; segment I of foretarsi much longer than last four together (10.5/7); segment I of hind-tarsi shorter than tibia (10.5/12). *Abdomen*. Dorsum dark brown, without markings; venter pale brown. *Terminalia* (Fig. 1, g). Clasper relatively short, apical half slightly swollen, with a number of minute hairs; shape of phallosome relatively simple.

FEMALE. *Head*. Covered with broad flat scales, those on a large median triangular area dark brown; those along nape also dark brown but appearing green or bluish-purple in certain positions; those along eye-margins pale; several dark upright scales present along the pale border to the eyes, the end of these scales very slightly expanded; antenna less plumose; torus pale brown, darker on inner side; clypeus brown; palpus dark brown, quite short, projecting very slightly in front of clypeus; proboscis dark brown, fairly long, only slightly shorter than fore-femur (12/13), apical part slightly enlarged. *Thorax*. Integument of mesonotum yellowish-brown, covered with narrow brown scales; scales over wing-root and along margin in front of wing-root not different from those on dorsocentral area; scutellar lobes covered with dark brown scales; postnotum dark

brown, bare; integument of pleurae pale brown; postpiracular area slightly brown; *apn* brown with white lanceolate scales having silvery sheen; *ppn* bare, with a bristle near posterior corner; sternopleura with lanceolate pale or silvery scales on upper part and posterior margin; about six slender bristles present on upper margin of sternopleura; some similar scales present on upper part of mesepimeron; one lower mesepimeral bristle, and one upper mesepimeral bristle; pre-alar knob dark brown, with a coarse bristle; no spiracular bristle. Haltere pale, knob dark brown. Wing scales dark brown; anterior fork shorter than posterior fork; sixth vein ending before fork of fifth vein; some broad lanceolate scales present on veins 2, 3 and 4 toward apex; squama and allula bare. Legs dark brown; femora paler beneath; segment I of fore-tarsi very little longer than last four together (11.5/10); segment I of hind-tarsi very little shorter than tibia. *Abdomen*. Dorsum dark brown, without markings; venter pale brown.

PUPA (as Fig. 6, g, h).

LARVA (Fig. 6, a-f). *Head*. Antenna rather slender, about six times as long as its basal diameter, shaft pale, with sparse strong spicules; hair 1-A single, inserted at about middle of shaft. Head pale, longer than broad, preclypeus greatly protruded at the insertion of hair 1-C; hair 1-C stout, long and slightly curved inward; hair 7-C 6-8-branched, about as long as antenna; 5, 6-C stout, flattened and spinulose; 4-C slender, single, as long as 5-C; 8-C furcated into 4; 9-C longer than 5-C, 4-5-branched; 10-C fine, single; 11-C 6-branched; 12-C 5-branched; 13-C 4-branched; 14-C single; 15-C trifid; median hairs of mouth brush apparently simple; mentum with about 11 coarse teeth. *Thorax*. Prothoracic hairs 1-3-P arising

close together on a small plate; 1, 2-P stout, single, plumose, nearly as long as head, subequal in length; 3-P slender and much shorter than 1, 2-P, 8-branched; 4-P about as long as 3-P, 8-branched; 5-P bifid, plumose, as long as 1, 2-P; 6, 7-P single, plumose, as long as 5-P; 8-P 7-branched. *Abdomen*. Segment VIII with a very large weakly sclerotized lateral plate on each side, carrying comb of 10-12 teeth, each with fringe at tip and sides, apical portion narrow; hair 1-VIII with 4-5 long branches, inconspicuously plumose; 2, 4-P both single; 3-VIII with 6-8 plumose branches; 5-VIII with 10-12 plumose branches. Anal segment completely ringed, posterior border of anal saddle with strong sharp spines; hair 1-X with 6-8 branches, 2, 3-X each with two long branches; 4-X consisting of ten hairs, each with 2-3 branches; anal gills narrow and pointed apically, longer than anal segment. Siphon pale, with acus; index about four in compressed specimens; pecten of 15-16 teeth, each tooth with round tip and fringe at tip and sides; hairs 1-S inserted at basal two-fifths, with 9-10 long branches.

TYPE SPECIMENS. Holotype, male (62346. 2) with larval and pupal skins, *ex* stream pool with reddish water, Aoshenshui, Yenchao, Kaohsiung Hsien, Taiwan, March 28, 1962, C. L. Chung, C. L. Li and M. M. Li; allotype, female (62346.1) with larval and pupal skins, same data as for holotypes; paratypes, nine males (61134. 4, . 7, . 8, . 10, . 14, . 15, . 16, . 17, . 18), and nine females (61134. 1, . 2, . 3, . 5, . 6, . 9, . 11, . 12, . 13), with corresponding larval and pupal skins, *ex* stagnant ditch with reddish water, Aoshenshui, Yenchao, Kaohsiung Hsien, Taiwan, January 9, 1956, J. C. Lien, T. S. Lo, and J. K. Ni, and one male (62346. 3) with larval and pupal skins, same data as for

holotype. The specimens are in the collection of Taiwan Provincial Malaria Research Institute, Nankang, Taipei Hsien, Taiwan, Republic of China.

DISTRIBUTION. Known only from type locality.

BIOLOGY. The immature stages breed in stagnant reddish water in ditches and pools. The habits of adults are unknown.

SYSTEMATICS. The female of this species when compared with Barraud's (1931) description of *Uranotaenia hebes* from Assam does not show marked difference from that species. Since the immature stages and male of *U. hebes* are not known, further comparison can not be made. Although future discovery of immature stages and male of *U. hebes* from Assam might reveal that this species is synonymous with *U. hebes*, it is here named as new in order to avoid unnecessary confusion.

REMARKS. This species is named after Mr. Jung Kuei Ni of Taiwan Provincial Malaria Research Institute, who participated in the field collection.

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台湾産蚊族の新種 (双翅目: 蚊科)
 第二報 *Tripteroides*, *Orthopodomyia*, *Culiseta*
 及び *Uranotaenia* 属の新種

連 日 清

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摘

要

本編では *Tripteroides*, *Orthopodomyia*, *Culiseta* 及び *Uranotaenia* 属の新種の成熟幼虫, 蛹及び雌雄成虫に就て記載を行なった。これらはそれぞれ *Tripteroides* (*Tripteroides*) *cheni*, n. sp., *Orthopodomyia* *lanyuensis*, n. sp., *Culiseta* (*Culiseta*) *lishanensis*, n. sp., *Uranotaenia* *lui*, n. sp. 及び *Uranotaenia* *nii*, n. sp. と命名された。前二者は台湾本島東南方の蘭嶼 (紅頭嶼) で, 他の三種は台湾本島で採集された。

Tripteroides cheni, n. sp. は *nitidoventer* 群に属し, *T. bambusa* に酷似するが, 後者とは次の様な相違点がある。1) 雄陰茎側面の形状, 2) 雌の貯精囊は一箇のみ, 後者では三箇, 3) 成虫の中胸背板の被膜は褐色,

後者では黒色。幼虫は区別が難しいが、前胸の4号毛は前者では4～5本、後者では2～3本に分枝する。雄陰茎の側面形状は *T. poweli* のとはある程度近似する。

Orthopodomyia lanyuensis, n. sp. は *anopheloides* 亜群に属し、幼虫は腹部の第一及び第二腹節の6号毛が太くなっている点で *O. madrensis* に酷似するが、成虫は腹部の腹面が一様に白色ではなく、翅の前縁脈基部の白色部分が狭く、吻の斑紋も異なる点等で区別される。後肢の白色斑紋は *O. wilsoni* のに酷似するが、幼虫は腹部の第一及び第二腹節の6号毛の形状で異なる。

Culiseta lishanensis, n. sp. は印度産の *C. niveitaeniata* に近似するが、次の諸点で異なる。1) 成虫の *ppn* 上部に金色の狭曲鱗片がある、後者では可成り巾の広い鱗片がある。2) 第四乃至第七腹節背板の基白帯は不完全、後者では完全。3) 雄陰茎の側面の形状、側片の *subapical lobe* の剛毛が細い、第九腹節の背板突起が相離れている。

Uranotaenia lui, n. sp. は *U. moultoni* 及び *U. breviscostis* とに近似し、後二者とは *sternopleuron* 及び *mesepimeron* に巾の広い灰色半透明の鱗片がある点で区別される。中胸背板の色は胸側のと強い対照をなす点で *U. breviscostis* よりも *U. moultoni* に酷似する。

Uranotaenia nii, n. sp. の雌は *U. hebes* とは殆んど相違が認められないが、後者の幼虫、蛹及び雄に関しては未だ記載がない為詳しい比較が出来ない。*U. hebes* と同一の可能性があるが、同定上の混乱を避ける為新種として命名した。

Fig. 1

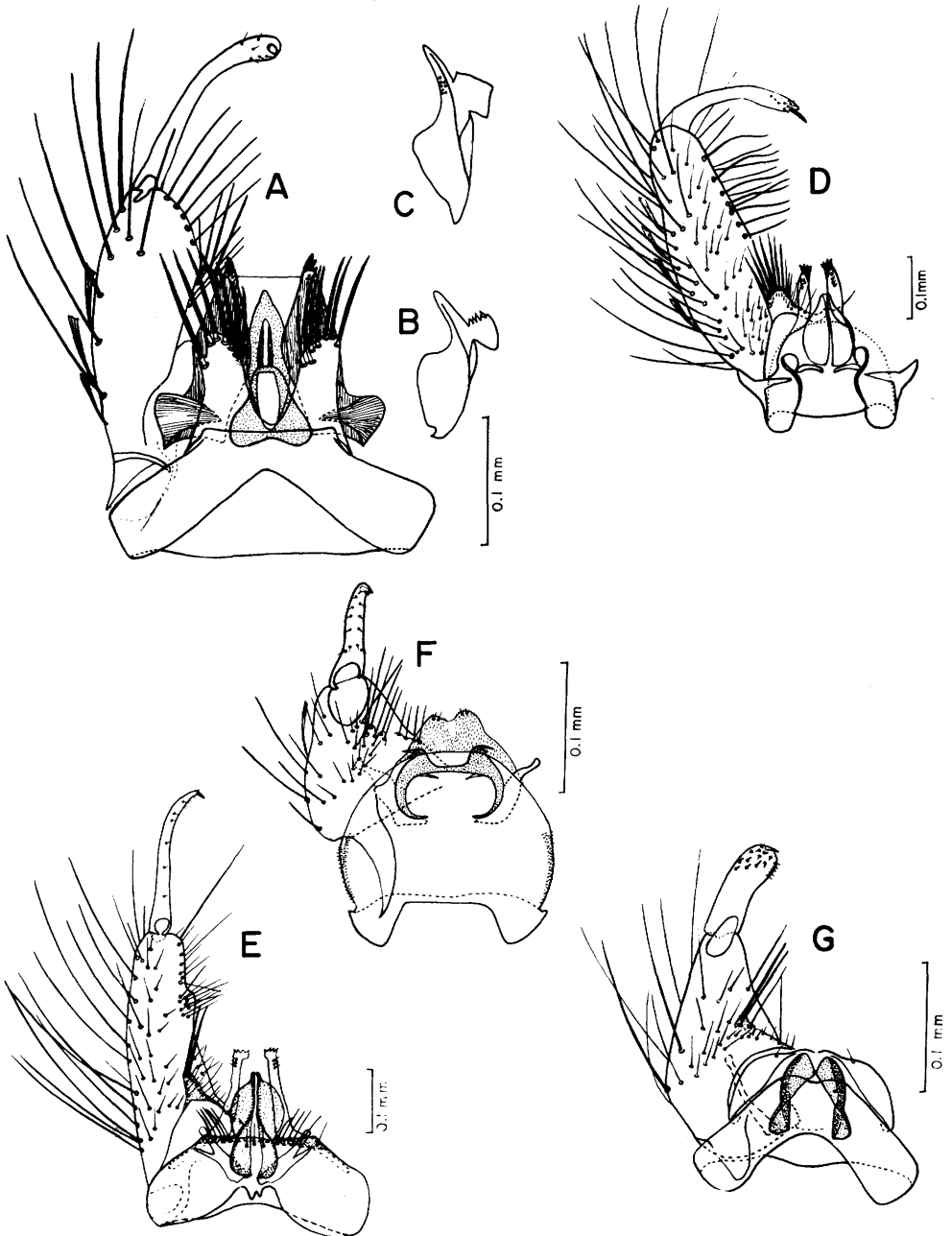


Fig. 1. A, terminalia of *Tripteroides cheni*, n. sp.; B, lateral view of phallosome of *Tripteroides cheni*, n. sp.; C, lateral view of phallosome of *Tripteroides bambusa* of Taiwan proper; D, terminalia of *Orthopodomyia lanyuensis*, n. sp.; E, terminalia of *Culiseta lishanensis*, n. sp.; F, terminalia of *Uranotaenia lui*, n. sp.; G, terminalia of *Uranotaenia nii*, n. sp.

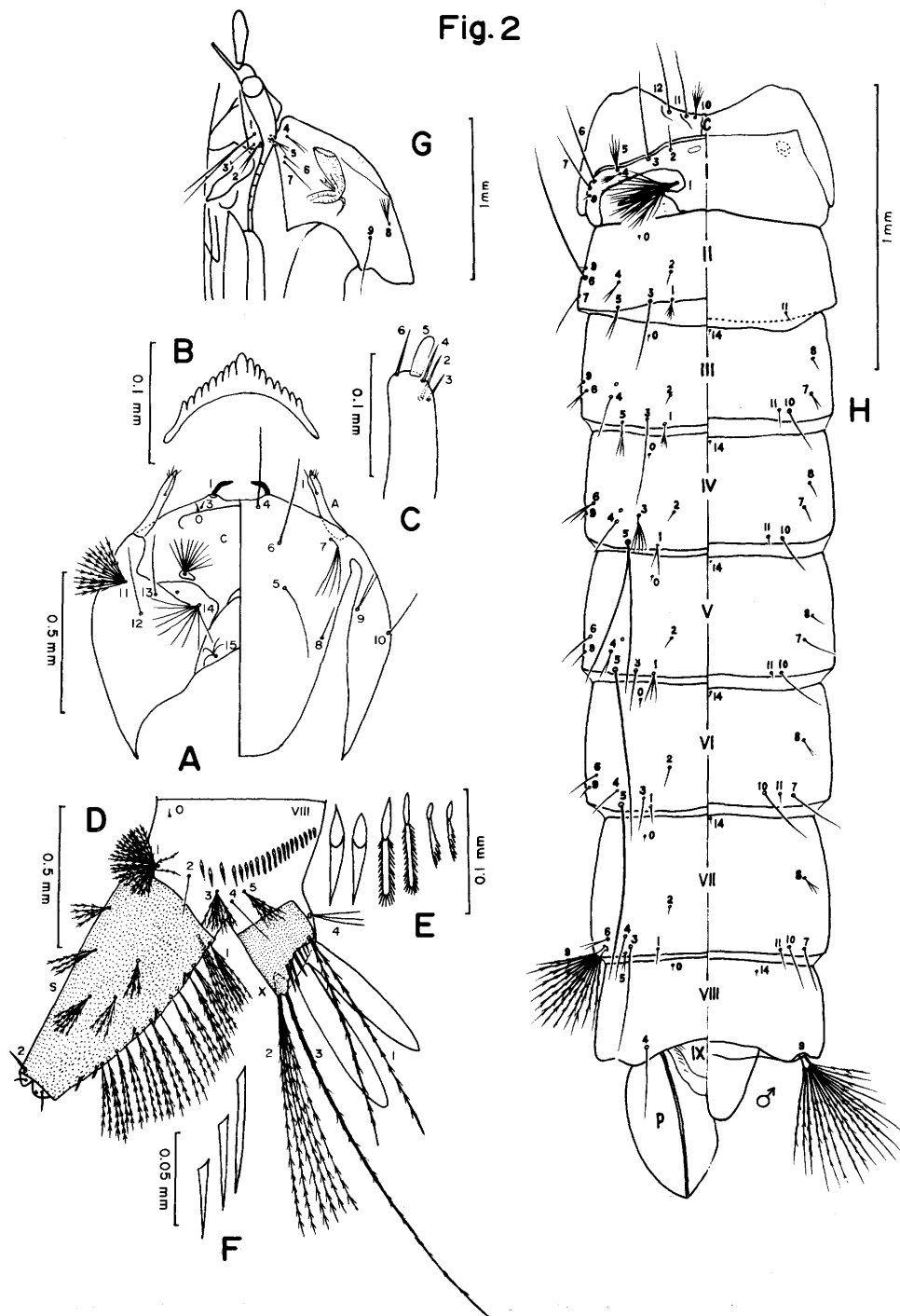


Fig. 2. *Tripteroides cheni*, n. sp.; A-F, larva; A, head; B, mentum; C, tip of antenna; D, terminal segments; E, comb teeth; F, pecten teeth; G-H, pupa; G, cephalothorax; H, metanotum and abdomen.

Fig. 3

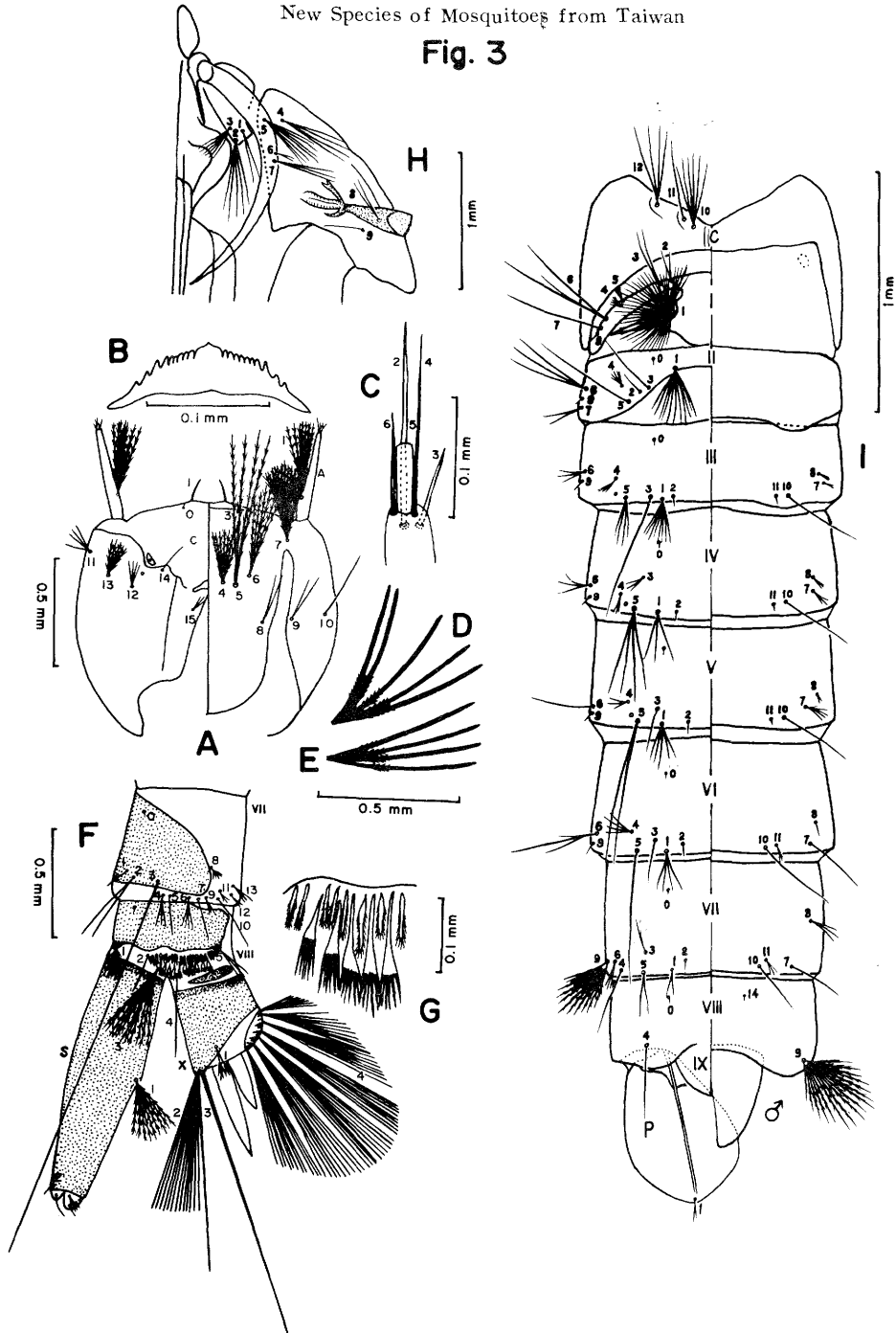


Fig. 3. *Orthopodomyia lanyuensis*, n. sp.; A-G, larva; A, head; B, Mentum; C, tip of antenna; D, abdominal hair 6-II; E, abdominal hair 6-I; F, terminal segments; G, comb teeth; H-I, pupa; H, cephalothorax; I, metanotum and abdomen.

Fig. 4

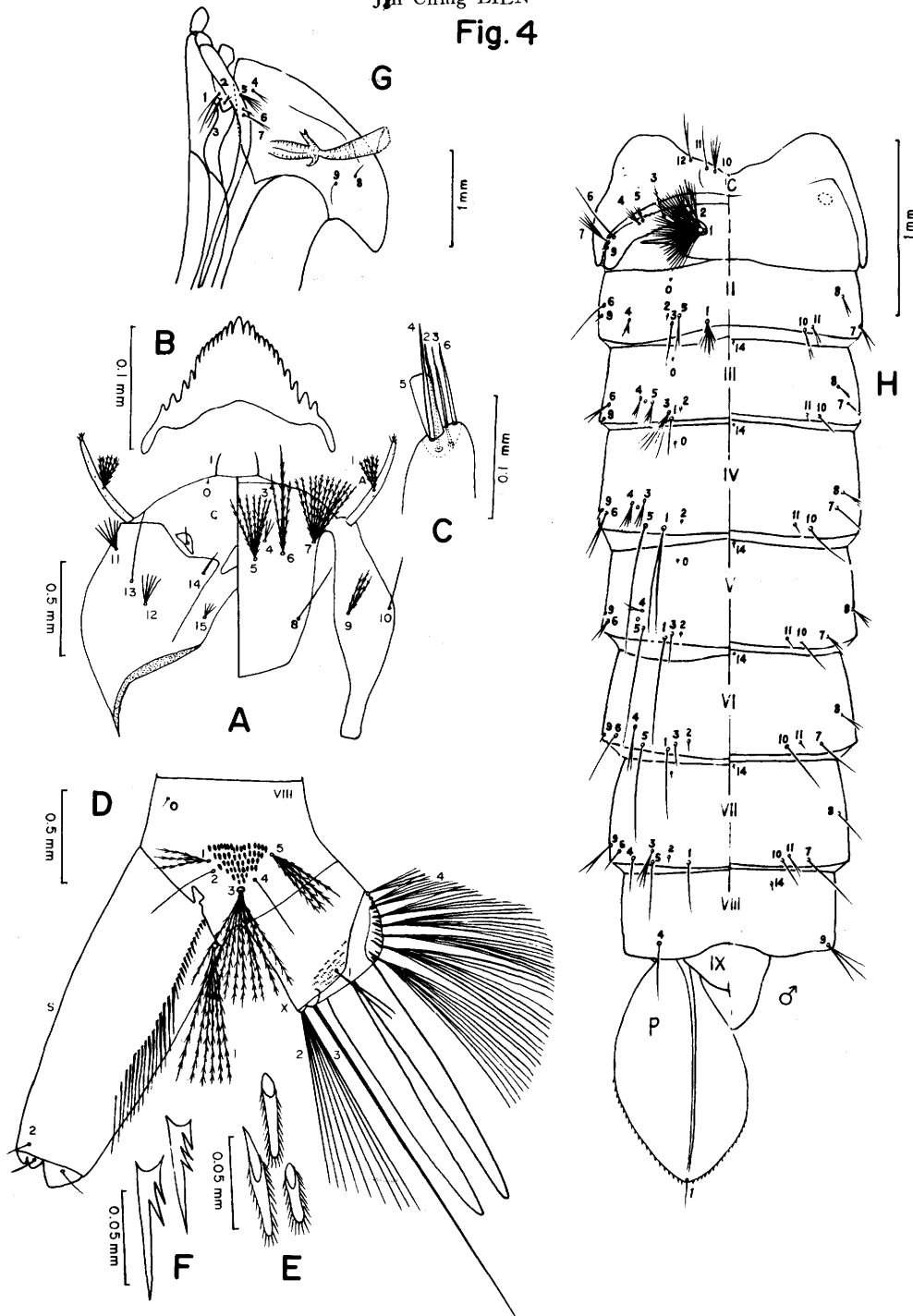


Fig. 4. *Culiseta lishanensis*, n. sp.; A-F, larva; A, head; B, mentum; C, tip of antenna; D, terminal segments; E, comb teeth; F, pecten teeth; G-H, pupa; G, cephalothorax; H, metanotum and abdomen.

Fig. 5

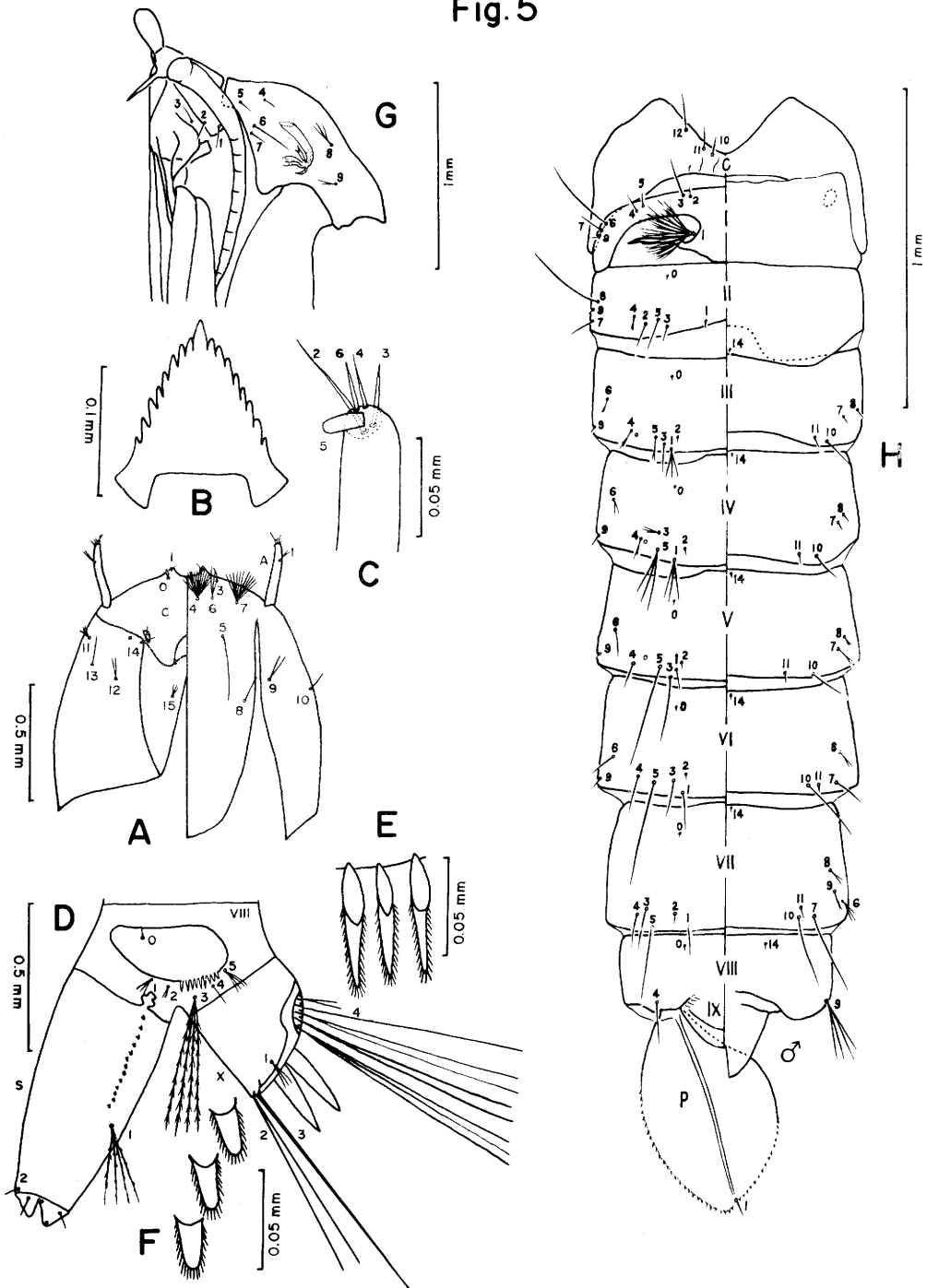


Fig. 5. *Uranotaenia lui*, n. sp.: A-F, larva; A, head; B, mentum; C, tip of antenna; D, terminal segments; E, comb teeth; F, pecten teeth; G-H, pupa; G, cephalothorax; H, metanotum and abdomen.

Fig. 6

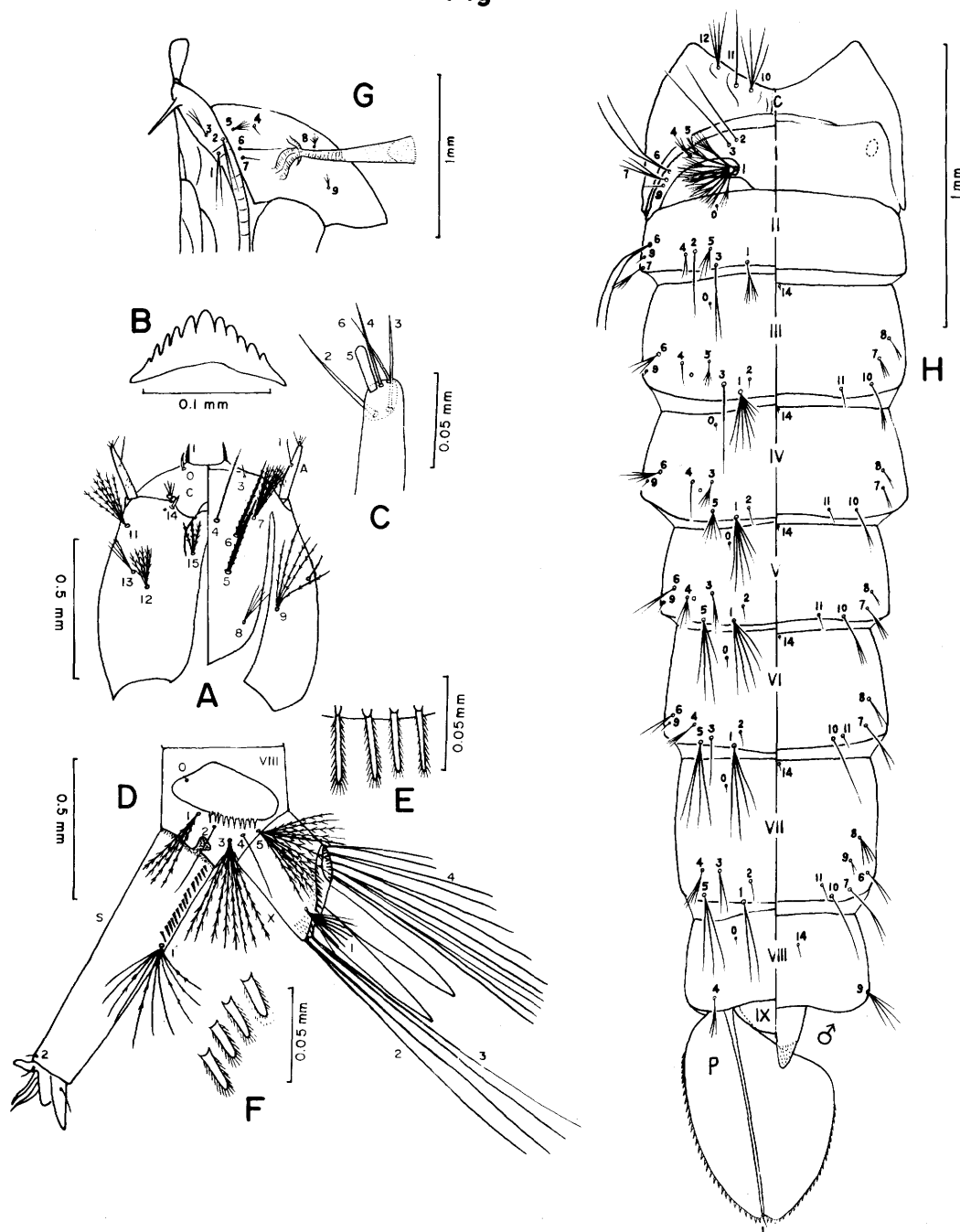


Fig. 6. *Uvanotaenia nii*, n. sp.; A-F, larva; A, head; B, mentum; C, tip of antenna; D, terminal segments; E, comb teeth; F, pecten teeth; G-H, pupa; G, cephalothorax; H, metanotum and abdomen.